ade if complete and reliable data were available conrning the relation of the weather to any irregular or nnual variations in these tests.

The success or failure of a year's work is dependent on the amount in which the crops may be favored by the weather, and although the farmer has no means of control over this element, there may be found several ways in which it is possible to take advantage of seemingly unfavorable conditions.

For this reason any facts which may be established through the investigation of these problems will help to give us a scientific knowledge of the different relations between weather and crops, and this knowledge put in workable form will enable agricultural experimenters, students, and farmers to clear up many things which are so little understood at this time, and thereby greatly improve the present status of agricultural practice.

THE INFLUENCE OF METEOROLOGICAL PHENOMENA ON VEGETATION.

Revue Scientifique, February, 1920, pp. 115-116.

Translated by KATHARINE DAVIS.

Dr. Azzi, of the University of Rome, has studied the relations existing between the critical periods of vegetation and meteorological phenomena. His method consists of observing at the same time the biological phenomena which dominate the life of plants and the meteorological phenomena which react on them with the greatest intensity. (Treatise presented by M. G. Wery to the Academy of Agriculture.)

Vegetation presents critical periods which are controlled by meteorological phenomena, rain, humidity (moisture), frost, heat, and dryness. Each period corresponds to a particular phase in the life of the plant; thus the critical period of vegetation of wheat with respect to rain is that, of variable duration, when this cereal requires, absolutely, a minimum of water. If rain does not fall at the precise time when the grain is in this critical period with respect to water, its development is hindered and the yield will be diminished.

In the same way for fruit trees, if the heat which is necessary for them in the corresponding critical period is less than they require, the crop will be decreased. (Leaf of Information of the Minister of Agriculture.)

Knowing the critical periods, it is necessary to know what are the mean epochs of the year when these occur for each one of the cultivated plants, epochs which vary with the region. One may then draw charts to which the author has given the name phenoscopic charts.

For each cultivated plant there are as many phenoscopic charts as there are critical periods and decisive meteorological factors; thus, there are four for grains relative to humidity (moisture); germination, earing, flowering, and maturity of grains.

Dryness being recognized as the determining cause for diminished return of grain crops in a particular zone, three methods are possible to agriculturists for offsetting this condition. (1) To avoid the phase of vegetation to which the critical period corresponds by modifying the time of seeding; (2) by modifying artificially the meteorological conditions during the critical period by irrigation if that is possible; and (3) to select grain in such a way as to obtain a variety which will resist the injurious meteorological phenomenon, dryness for example.

Phenoscopic charts may, then, assist to a knowledge of climatic conditions as geological charts assist to a knowledge of the soil and consequently of fertility.

THE INFLUENCE OF COLD IN STIMULATING THE GROWTH OF PLANTS.

By FREDERICK V. COVILLE.

[Abstracted from *Journal of Agricultural Research*, vol. 20, No. 2, Oct. 15, 1920.]

It is the general belief that dormancy in winter of our native trees and shrubs is brought about by cold weather, and that warm weather is of itself sufficient to start new growth in spring. Mr. Coville shows that both of these ideas are erroneous. From a number of very interesting and instructive experiments with blueberry plants under controlled conditions, it is shown that cold weather is not necessary for the establishment of complete dormancy and that after it is established the exposure of plants to ordinary growing temperatures does not suffice to start them into growth; also that plants will not resume normal growth in spring unless they have been subjected previously to a period of chilling. Finally, a theory is advanced to explain this paradoxical effect of cold in stimulating growth. The subject is presented in a series of numbered statements, with supporting evidence in each case.

Healthy blueberry plants were put into a greenhouse at the end of summer and kept at ordinary growing temperatures, but they gradually dropped their leaves and finally went into a condition of complete dormancy. The only difference between the behavior of the indoor and outdoor specimens was a tardiness of the former in assuming dormancy, probably due to a lack of injury to the foliage by freezing temperature.

Plants that were kept continuously warm during the winter started into growth much later in spring than those that were subjected to a period of chilling, while some that had been outdoors during the winter were brought into the greenhouse in early spring. The latter burst into leaf and flower luxuriantly, while the former remained completely dormant. In some cases, plants remained dormant a whole year under heat, light, and moisture conditions favorable for luxuriant growth. As a further test of the matter, some of the branches of a plant were extended through an opening in the greenhouse in one case, and in another the plant was placed just outside with some of the branches extending into the house. When spring came the outdoor branches, in both cases, put out leaves promptly and normally, but the interior branches remained dormant.

In explanation of these phenomena, Mr. Coville points out that the stimulating effect produced on dormant plants by cold is intimately associated with the transformation of stored starch into sugar. Stated in terms of simplicity, stripped of technical phraseology, the theory advanced in explanation of the formation of sugar during the process of chilling is that the starch grains stored in the cells of the plant are at first separated by the living and active cell membranes from the enzym that would transform the starch into sugar, but when the plant is chilled the vital activity of the cell membrane is weakened so that the enzym "leaks" through it, comes in contact with the starch, and turns it into sugar.